



**U.S. Department of Justice**

Office of Justice Programs

*National Institute of Justice*

Office of the Director

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**Q&A**  
**Third Status Report to the Attorney General on Body Armor Safety Initiative**  
**Testing and Activities**  
**August 24, 2005**

**1. What is the Attorney General's Body Armor Safety Initiative?**

On November 17, 2003, Attorney General John Ashcroft announced a body armor safety initiative in response to concerns from the law enforcement community regarding the effectiveness of bullet-resistant armor. These concerns followed the failure of a relatively new Zylon<sup>®</sup>-based body armor worn by a Forest Hills, Pennsylvania, police officer. Attorney General John Ashcroft directed the National Institute of Justice (NIJ) to initiate an examination of Zylon<sup>®</sup>-containing bullet-resistant armor (both new and used), to analyze upgrade kits provided by manufacturers to retrofit Zylon<sup>®</sup>-containing armors, and to review the existing process by which bullet-resistant armor is tested to determine if the process needs modification. To accomplish these goals, NIJ has worked in collaboration with its technical partners, the Office of Law Enforcement Standards (OLES) at the National Institute of Standards and Technology (NIST) and the National Law Enforcement and Corrections Technology Center (NLECTC) in Rockville, Maryland.

NIJ has issued three status reports to the Attorney General containing results from its body armor studies. These reports are available at <https://vests.ojp.gov/index.jsp>.

**2. Thus far, what has the Department of Justice's research discovered concerning Zylon<sup>®</sup>-containing bullet-resistant armor?**

- Used Zylon<sup>®</sup>-containing armor may not provide the intended level of ballistic protection.
- Of 103 used Zylon<sup>®</sup>-containing armors tested by NIJ, 60 (58%) were penetrated by at least one round during a six-shot test series. Of those that passed penetration testing, 91% showed backface deformation in excess of that allowed by the NIJ standard for new armor. Only four armors met all performance criteria expected under the NIJ standard for new body armor compliance.

- Zylon<sup>®</sup> yarns taken from used armor samples exhibited degraded tensile strength characteristics.
- A visual inspection of body armor and its ballistic panels does not indicate whether a particular piece of Zylon<sup>®</sup>-containing body armor has maintained its ballistic performance.
- A sealed tube study confirmed that if PBO<sup>1</sup> is isolated from external sources of moisture there is no significant change in its properties.

Prior NIJ status reports included the following additional findings:

- Ballistic-resistant material, including Zylon<sup>®</sup>, can degrade due to environmental factors, thus reducing the ballistic resistance safety margin that manufacturers build into their armor designs.
- The ultimate tensile strength of single yarns removed from the rear panel of the Forest Hills armor was up to 30% lower than that of yarns from “new armor” supplied by the manufacturer. Artificially aged armors of the same type that failed in the Forest Hills incident were ballistically tested but no bullet penetrations occurred.<sup>2</sup>
- The “upgrade kits”<sup>3</sup> tested by NIJ did not appear to bring used armor up to the level of performance of new armor. However, used armors with upgrade kits performed better than the used armor alone.

### 3. What is NIJ doing in response to these findings?

- NIJ is taking the following steps:
  - NIJ intends to adopt new interim requirements for its body armor compliance testing program to aid in ensuring that officers are protected by body armor that maintains its ballistic performance during its entire warranty period. These actions are set forth in detail in Section VI of the *Third Status Report to the Attorney General on Body Armor Safety Initiative Testing and Activities*. Under the NIJ 2005 Interim Requirements for Bullet-Resistant Body Armor, armor models containing PBO or Zylon<sup>®</sup> will not be compliant, unless their manufacturers provide satisfactory evidence to NIJ that the models will maintain their ballistic performance over their declared warranty period. Also, manufacturers will be required to submit information concerning materials used in the construction of any armor submitted for compliance testing by NIJ.

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<sup>1</sup> PBO: PBO fiber – poly-*p*-phenylene benzobisoxazole, the chemical basis for Zylon<sup>®</sup>.

<sup>2</sup> NIJ continues to study the Forest Hills body armor penetration to resolve the cause of that failure.

<sup>3</sup> Upgrade kits were provided by the body armor manufacturer, Second Chance, to retrofit Zylon<sup>®</sup>-based bullet-resistant armors.

- In the future, NIJ will issue advisories to the field regarding materials used in the construction of body armor that appear to create a risk of death or serious injury as a result of degraded ballistic performance. Any body armor model that contains any material listed in such an advisory will be deemed no longer NIJ-compliant unless and until the manufacturer satisfies NIJ that the model will maintain its ballistic performance over its declared warranty period.
- NIJ is expanding its research program to provide a better understanding of degradation mechanisms of other ballistic materials and how they affect armor performance. NIJ will also continue its research to assist in developing nondestructive methods for testing the ongoing performance of body armor.

**4. Why is NIJ adopting interim changes to its compliance testing process?**

There are limited data concerning the ongoing performance of ballistic-resistant materials and associated armor systems currently in widespread use in the United States. Also, there is no accepted test protocol to evaluate the performance of used body armor over a period of years of typical law enforcement use. Future testing and research will support the development of a comprehensive and scientifically-rigorous compliance testing process to help assure officers that their armor will continue to protect them over the armor's full warranty period.

**5. Does this mean that NIJ will no longer be testing Zylon<sup>®</sup>-containing body armor?**

Zylon<sup>®</sup>-containing armor models will be eligible for NIJ compliance testing if the manufacturer can provide satisfactory evidence to NIJ that the armor model will maintain the intended level of ballistic performance throughout the warranty period.

**6. What specific Zylon<sup>®</sup>-containing body armor models have been tested in the Body Armor Safety Initiative?**

A complete list of all body armor models tested (and the results) is contained in the *Third Status Report to the Attorney General on Body Armor Safety Initiative Testing and Activities*, which can be found at <https://vests.ojp.gov/index.jsp>.

**7. What about the testing of body armor that does not contain Zylon<sup>®</sup>?**

The Body Armor Safety Initiative focused on Zylon<sup>®</sup>-based body armor. Future phases of this initiative will examine other commonly used ballistic-resistant materials.

**8. My Zylon<sup>®</sup>-containing armor is not a model that was tested as part of the Body Armor Safety Initiative. Should I replace it?**

While current testing results do not conclusively prove that all Zylon<sup>®</sup>-containing body armor models have performance issues, the results clearly show that used Zylon<sup>®</sup>-

containing body armor may not provide the intended level of ballistic resistance. In considering whether to replace body armor, NIJ's research findings should be carefully reviewed, since there were performance variations among the Zylon<sup>®</sup>-containing armors that were tested.

**9. How long is newly purchased Zylon<sup>®</sup>-containing body armor safe to use?**

Based upon the results of NIJ's research, there is no clear correlation between armor age and ballistic performance. The research indicates that Zylon<sup>®</sup>-containing armor that is more than two years old may demonstrate significant ballistic degradation. As the armor samples that were tested did not include a significant number of armors that were less than two years old, the performance of newer armors cannot be predicted.

**10. I have closely followed all of the care instructions provided by the manufacturer of my armor and my vest looks like new. Does this mean that purchasing replacement armor may not be necessary?**

Based on NIJ's findings, there appears to be no correlation between the appearance of Zylon<sup>®</sup>-containing armor and ballistic performance in NIJ's testing. The results imply that a visual inspection of the armor and its ballistic panels does not indicate whether a particular piece of Zylon<sup>®</sup>-containing body armor will perform acceptably. Nonetheless, users are strongly urged to follow all care instructions for their armor.

**11. Are there other lightweight ballistic armors available that I can purchase?**

The Department of Justice cannot recommend any specific body armor model for purchase. NIJ is replacing the list of armor compliant with NIJ Standard 0101.04 with a new database of armor compliant with the NIJ 2005 Interim Requirements. A database of compliant armor will be maintained at <http://www.justnet.org>.

**12. When will further test results be forthcoming?**

NIJ is conducting its scientific examination as quickly as possible. Further status reports to the Attorney General will be posted on the Bulletproof Vest Partnership Program website (<https://vests.ojp.gov/index.jsp>). Additional reports on body armor testing and research results will be provided to law enforcement as soon as possible after the test data have been obtained.

**13. In light of these current research findings, is the Department of Justice establishing any new or additional funding assistance for the purchase of replacement body armor?**

Funding provided by the Department of Justice for body armor purchases is coordinated and administered through the Office of Justice Programs' Bureau of Justice Assistance's Bulletproof Vest Partnership (BVP) Program. To better meet the vest replacement needs of America's law enforcement agencies this year, the Department will make available

\$10 million, in addition to the \$23.6 million available through the FY 2005 BVP Program, for bullet-resistant body armor. For information regarding this special BVP solicitation visit: <http://www.ojp.usdoj.gov/BJA/grant/bulletproof.html>. More details about the BVP program may be found at: <https://vests.ojp.gov/index.jsp>.

**14. What is the Department of Justice doing to keep law enforcement officers informed about the latest developments in the ongoing analysis and study of armors?**

A new web resource entitled “Body Armor Safety Initiative” has been incorporated into the Internet-based Bulletproof Vest Partnership Program application at <https://vests.ojp.gov/index.jsp>, with links and information on official government and industry statements, the Vest Safety Initiative Summit, current evaluation activities, and FAQ’s. Additional information may be found at <http://www.justnet.org>.

**15. My body armor contains Zylon<sup>®</sup>. Should I stop wearing it?**

**Absolutely not.** NIJ urges officers to continue to wear the armor that is issued or authorized by their agencies. An officer's risk of fatality is 14 times greater when not wearing body armor. Since bullet-resistant vests were introduced more than 30 years ago, they have saved 2,900 lives and officer homicides have decreased by two-thirds. Even armor that may have degraded ballistic performance is better than no armor.

NIJ will continue to provide timely results on our ongoing examination of Zylon<sup>®</sup>-based armors to assist in future decisions.